WHAT IS CLAIMED IS:

1. A method of removing residue from a substrate processing chamber, said method comprising the steps of:

forming a plasma remotely with respect to said chamber, said plasma including a plurality of reactive radicals;

forming a flow of said reactive radicals traversing toward said chamber;

forming a diluent gas flow;

mixing said flow of said reactive radicals and said diluent gas flow anterior to said chamber to form a gas-radical mixture; and

flowing said gas-radical mixture into said chamber.

2. The method as recited in claim 1 wherein said flow of reactive radicals and said gas flow are established to maintain a pressure within said chamber below one torr.

3. The method as recited in claim 1 wherein said reactive radicals comprise of the atoms associated with a reactive gas, with said reactive gas being selected from a group consisting of NF_3, dilute F_2, CF_4, C_2F_6, C_3F_8, SF_6, and ClF_3.

4. The method as recited in claim 1 wherein said diluent gas flow comprises an inert gas.

5. The method as recited in claim 1 wherein said diluent gas flow comprises of a reduction gas.

6. The method as recited in claim 1 wherein said chamber has components therein, with a subset of said radicals in said gas-radical mixture reacting with said components creating a residue and further including the step of exhausting

said residue, with a rate at which said residue is exhausted is depending upon a rate of said diluent gas flow.

7. The method as recited in claim 1 wherein said diluent gas flow travels at a first rate and said flow of said reactive radicals travel at a second with a ratio of said first rate to said second rate being at least 2:1.

8. A deposition device, including:

a process chamber having an intake port;

a plasma source for generating a plasma consisting of reactive radicals;

a supply of diluent gas;

a pump system in fluid communication with said plasma source and said supply of gas to create a diluent gas flow and a flow of said reactive radicals; and

a fluid manifold having multiple inlets and an outlet with said outlet being coupled to said intake port and one of said inlets being in fluid communication with the said plasma source, with the remaining inlets being in fluid communication with said supply of diluent gas so as to allow said diluent gas flow and said flow of said reactive radicals to mix when traveling between said inlets and said outlet forming a gas-radical mixture egressing from said outlet and traversing through said intake port.

9. The deposition device as recited in claim 8 wherein said supply of diluent gas comprises of an inert gas.

10. The method as recited in claim 8 wherein said diluent gas flow travels at a first rate and said flow of said reactive radicals travel at a second with a ratio of said first rate to said second rate being at least 2:1.

11. The deposition device as recited in claim 8 wherein said supply of diluent gas comprises of a reducing gas.

12. The deposition device as recited in claim 8 wherein said plasma source comprises of a plasma applicator defining an internal volume and a supply of reactive gas in fluid communication with said internal volume, with said supply of reactive gas being selected from a group consisting of NF_3, dilute F_2, CF_4, C_2F_6, C_3F_8, SF_6, and ClF_3.

13. The deposition device as recited in claim 8 wherein said plasma applicator includes a microwave source in electrical communication with said plasma applicator.

14. The deposition device as recited in claim 8 wherein said pump system maintains a pressure within said chamber below one torr.

15. The deposition device as recited in claim 9 wherein said inert gas is argon.

16. An substrate processing system comprising:

a processing chamber having an intake port;

a supply of diluent gas;

a plasma source for generating a plasma consisting of reactive radicals, said plasma source including a conductive plasma applicator defining an internal volume, said applicator having an input aperture and an output aperture, each of which is equipped with microwave arrestors;

a fluid manifold having multiple inlets and an outlet with said outlet being coupled to said intake port and one of said inlets being in fluid communication with said gas outlet, with the remaining inlets being in fluid communication with said supply of diluent gas;

a pump system, in fluid communication with both said plasma source and said supply of diluent gas, to create a diluent gas flow and a flow of said reactive radicals, with said flow of said reactive radicals traversing said output aperture toward said mixing manifold and said flow of gas traveling from said supply to said mixing manifold, with said gas flow and said flow of said reactive radicals combining when traveling between said inlets and said outlet forming a gas-radical mixture egressing from said outlet and traversing through said intake port;

a controller configured to regulate said pump system and said plasma source; and

a memory, coupled to said controller, comprising a computer-readable medium having a computer-readable program embodied therein for directing operation of said substrate processing system, said computer-readable program including a set of computer instructions to be operated on by said controller to regulate the introduction of said radicals from said plasma into said mixing manifold, said set of computer instructions including:

a first subroutine to be operated on by said controller to regulate said pump system to introduce said reactive radicals into said mixing manifold at a first rate to and said diluent gas at a second rate so as to maintain a pressure with said chamber less than one torr.

17. The apparatus of claim 16 wherein said first rate is in the range of 200 and 400 sccm and said second rate is in the range of 500 and 800 sccm.

18. The apparatus of claim 16 further including a gas delivery system in fluid communication with said plasma applicator to transmit a reactive gas thereto, with said controller being configured to regulate gas delivery system, wherein said set of computer instructions further includes a second subroutine instructions to be operated on by said controller to regulate said gas delivery system to introduce said reactive gas at a first rate to said gas inlet during a first time period at a first flow rate; a third subroutine of computer instructions for controlling said pump system to

maintain a pressure of about 1-20 torr within said applicator during said first time period.

19. The apparatus of claim 16 further including a microwave source in electrical communication with said plasma applicator, with said controller being configured to regulate said microwave source, wherein said set of computer instructions further includes a fourth subroutine to be operated on by said controller to regulate said microwave source to direct microwaves into said internal volume of said applicator during said first time period.

20. The apparatus of claim 19 wherein said fourth subset of computer instructions controls said remote microwave plasma system to direct said microwave energy at a power level ranging from about 150-500 W to ignite said plasma in said applicator.